Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester IV - 2021
Course Code : PET2012
Course Name : Sem IV - PET2012 - Reservoir Fluid Mechanics
Program : PET

Date : 21-JUN-2023
Time : 9.30AM - 12.30PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(10 X 3 = 30M)**

1. Define Mach number. Also. state its significance.
(CO4) [Knowledge]

2. Describe stagnation properties with respect to compressible flow.
(CO4) [Knowledge]

3. Describe the velocity potential function. Also, state its mathematical equation.
(CO2) [Knowledge]

4. List the purpose of pitot tube and rotameter.
(CO3) [Knowledge]

5. Describe steady and unsteady flow.
(CO3) [Knowledge]

6. List the differences in venturimeter and orifice meter.
(CO3) [Knowledge]

7. Describe streamline and its importance in fluid mechanics.
(CO2) [Knowledge]

8. Describe uniform and non-uniform flow.
(CO3) [Knowledge]

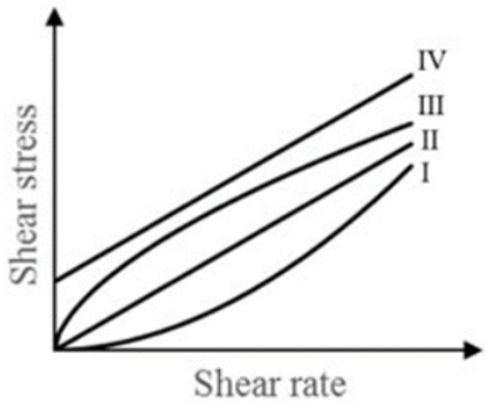
9. Define Bulk Modulus and compressibility of the fluid along with its mathematical equation.
(CO1) [Knowledge]

10. Define friction loss in the pipe. Describe Darcy Weisbach's equation for head loss in the pipe.
(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(2 X 15 = 30M)**

11. Identify the types of fluid (I, II, III, IV) from the graph given below. Explain each of the fluids with examples (at least 2).



(CO1) [Comprehension]

12. (a) Discuss the orifice meter. (5M)
(b) An orifice meter with an orifice diameter of 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 16.62 N/cm2 and 9.81 N/cm2. The coefficient of discharge for the orifice meter is given as 0.6. Find the discharge of water through the pipe. (10M)

(CO3) [Comprehension]

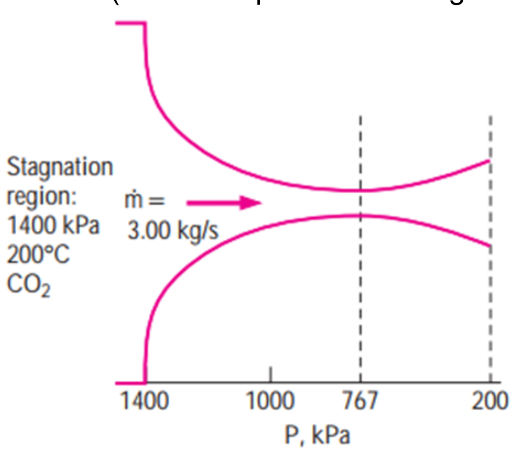
PART C

ANSWER ALL THE QUESTIONS **(2 X 20 = 40M)**

13. Bernoulli's theorem states that the total mechanical energy of the moving fluid comprising the gravitational potential energy of elevation, the energy associated with the fluid pressure and the kinetic energy of the fluid motion, remains constant. Derive an expression for this theorem.

(CO3) [Application]

14. Carbon dioxide flows steadily through a varying cross-sectional area duct such as a nozzle shown in Fig. at a mass flow rate of 3 kg/s. The carbon dioxide enters the duct at a pressure of 1400 kPa and 200°C with a low velocity, and it expands in the nozzle to a pressure of 200 kPa. The duct is designed so that the flow can be approximated as isentropic. Determine the (a) density, (b) velocity, (c) flow area, and (d) Mach number at each location along the duct that corresponds to a pressure drop of 200 kPa. (Assume Cp = 0.846 KJ/Kg.K and $\gamma = 1.289$)



(CO4) [Application]